

Work Order ID 81523

81523

Page 1

March-15-12 8:44:07 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop ***NS2***

Start Date: 15/03/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/03/15 Tooling:

Date:

Run Start ***NR1***

QC:

Date: SPC (Y/N):

Date:

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D350-748-241

F

100

0.00

100

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPD350-748-201 CHG002

110

0.00

110

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT

JW

12-4-3

120

QC15- Crosstube Dimensional Check

0.00

120

QC

Memo

0.00



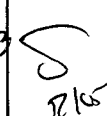
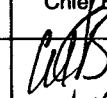
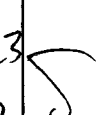
Quality Control

N/A Tube is SCRAP See PTO

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12.04.11	110	too narrow after bending (1" narrow)	 12/05/23 PST 042	SCRAP P12.04.11	 12-05-23	 12/05/23	 12/05/23 PST 042	 12/05/23

NOTE: Date & initial all entries

81523

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N900040100

Setup Start *NS1*

Stop *NS2*

Start Date: 15/03/2012 **Start Qty:** 1.00 ***1***

Cust Item ID:

Required Date: 04/04/2012 **Req'd Qty:** 1.00 *** 1 ***

Customer:

Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

**Insp.
Stamp**

0.00

125

HandFXtube

Hand Finishing Crosstubes

Memo

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: _____

Start time:

Finish time:

0.00

use P10 to meter

PRO: 16638

as per DEO D356-748-241 F.1

QC5- Inspect part completeness to step on W/O

0.00

127

QC

Memo

0.00

Quality Control

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

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Work Order ID 81523***81523***

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Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Crosstubes	0.00							
130									
Crosstubes	Memo	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-241								
	4-Remove all marks from tube within limits of D350-748-241								
	5- Apply a light coat of LPS3 on the interior of tube Batch: _____								
140	QC6- Inspect dimensions to drawing	0.00							
140									
QC	Memo	0.00							
Quality Control									

N/A

W/O:		WORK ORDER CHANGES						
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Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00 ***1***

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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150 Outsource process-Cadplate per QSI017 4.1.9.1 0.00

150

Outsource3

Outsource process - Cad plate

Memo

Issue P/O: 16826
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possible Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

0.00

CX 12/04/25 (V)

160 Receive & Inspect for Damage & Mat'l Certs 0.00

160

Packaging

Packaging

Memo

Ensure certificate of conformity is attached

0.00

4/24/15 (U)
4/24/15 (U)

170 QC5- Inspect part completeness to step on W/O 0.00

170

QC

Quality Control

Memo

0.00

W 12.05.22 (U)

perch. issue P/O to Lauren P/O: 17031 CX 12/05/22
rec'd rec'd + inspect attached c/c to W/O.

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Revision ID:

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Stop

NS2

Start Date: 15/03/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
180	SprayPaint								
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 2-Paint Outside of Tube as per Dart QSI 005 4.2								
190	QC14- Inspect Spray Paint	0.00							
190									
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
200	Crosstubes								
Crosstubes	Memo	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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N900040100

Setup Start *NS1*

Stop *NS2*

Start Date: 15/03/2012 **Start Qty:** 1.00

*** 1 ***

Cust Item ID:

Required Date: 04/04/2012 **Req'd Qty:** 1.00

* 1 *

Customer:

Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

**Insp.
Stamp**

QC5- Inspect part completeness to step on W/O

0.00

210

QC

Memo

0.00

Quality Control

Pick Kit

0.00

220

Packaging

Memo

0.00

Packaging

QC4- 100% Inspect kits for completeness

0.00

230

QC

Memo

0.00

Quality Control

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID 81523

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Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/04/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
240	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPPD350-748-201								
	Location: _____								
	PPP Rev: _____								
250	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	Memo	0.00							
Quality Control									

mf
12-05-23

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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⁵March-15-12 8:44:11 AM

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

81523

D350-748-201

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F
 10.08.04 added QS1010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-241TRN		Manufactured	No	B73370		110	Each	0.0000	1	1		12-4-3	
D350-748-241TRN													
Crosstube Turning Detail													
ALS4-1032-225		Purchased	No			200	Each	1,102.000	1	1			
ALS4-1032-225													
Insert													
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST281		1019							
				108696		146							
				110768		62							
				118386		55							
				118966		68							
				120671		688							
				ST282		83							
				120410		70							
				120451		13							
AN960JD10	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1			
AN960JD10													
Washer													

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

Picklist Print

March-15-12 8:44:11 AM

Work Order ID: 81523

81523

Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

D2856-400

Manufactured No

200 f

199.5445 1.181 1.243158

D2856-400

Abrasion Strip

Location

Loc Qty

Loc Code

ST409

199.5445

63735

0.6696

68076

0.3149

71164

8.46

79551

190.1

1- cut as per dwg D2856

D3502-1

Manufactured No

200 Each

39.0000 2 2

D3502-1

Support

Location

Loc Qty

Loc Code

ST051

39

73419

19

74873

20

MS21920-20

Purchased No

200 Each

60.0000 2 2

MS21920-20

Clamp (per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

LG050

60

116799

8

120475

2

120676

50

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Work Order ID: 81523

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Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

258.0000

1

1

MS27039-1-10

Screw

Location

Loc Qty

Loc Code

GA

100

120449

100

ST291

158

120120

158

AN4-41A

Purchased

No

220

Each

387.0000

8

8

AN4-41A

Bolt

Location

Loc Qty

Loc Code

ST360

387

115108

3

115705

7

117619

27

118451

50

118838

50

119328

100

120423

150

AN4-6A

Purchased

No

220

Each

1,649.000

16

16

AN4-6A

Bolt

Location

Loc Qty

Loc Code

ST356

1649

119017

1649

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Parent Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

AN5-32A Purchased No 220 Each 256.0000 4 4

AN5-32A

Bolt

Location	Loc Qty	Loc Code
ST339	256	
119328	100	
119862	50	
120423	75	
120717	1	
120910	30	

AN960JD416 NAS1149D0463J Purchased No 220 Each 14.0000 32 32

AN960.ID416

Washer

Location	Loc Qty	Loc Code
ST351	14	
116289	14	

AN960JD516 NAS1149D0563J Purchased No 220 Each 0.0000 8 8

AN960.ID516

Washer

D3500-1 Manufactured No 220 Each 35.0000 4 4

D3500-1

Saddle

Location	Loc Qty	Loc Code
ST424	35	
73406	8	
76000	27	

W/O:		WORK ORDER CHANGES						
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Parent Item Name: Crosstube Installation, High Aft

Start Date: 15/03/2012

Required Date: 04/04/2012

Start Qty: 1.00

Required Qty: 1.00

D3501-1 Manufactured No

220 Each 361.0000 16 16

D3501-1

Bushing

Location

Loc Qty

Loc Code

ST051

361

67757

4

70682

83

73391

6

74866

207

77033

61

MS21042L4 Purchased No

220 Each 5,585.000 24 24

MS21042L 4

Nut

Location

Loc Qty

Loc Code

ST300

5585

117441

51

117601

157

117885

16

118451

133

119017

232

119075

2996

121011

2000

MS21042L5 Purchased No

220 Each 1,602.000 4 4

MS21042L 5

Nut

Location

Loc Qty

Loc Code

ST300

1602

116105

5

116548

43

117611

42

118179

12

119109

1500

W/O:		WORK ORDER CHANGES					
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DART AEROSPACE LTD		Work Order: 81523	
Description: Crosstube High Aft		Imber:	D350-748-201
Inspection Dwg: D350-748-241		Page 1 of 1	

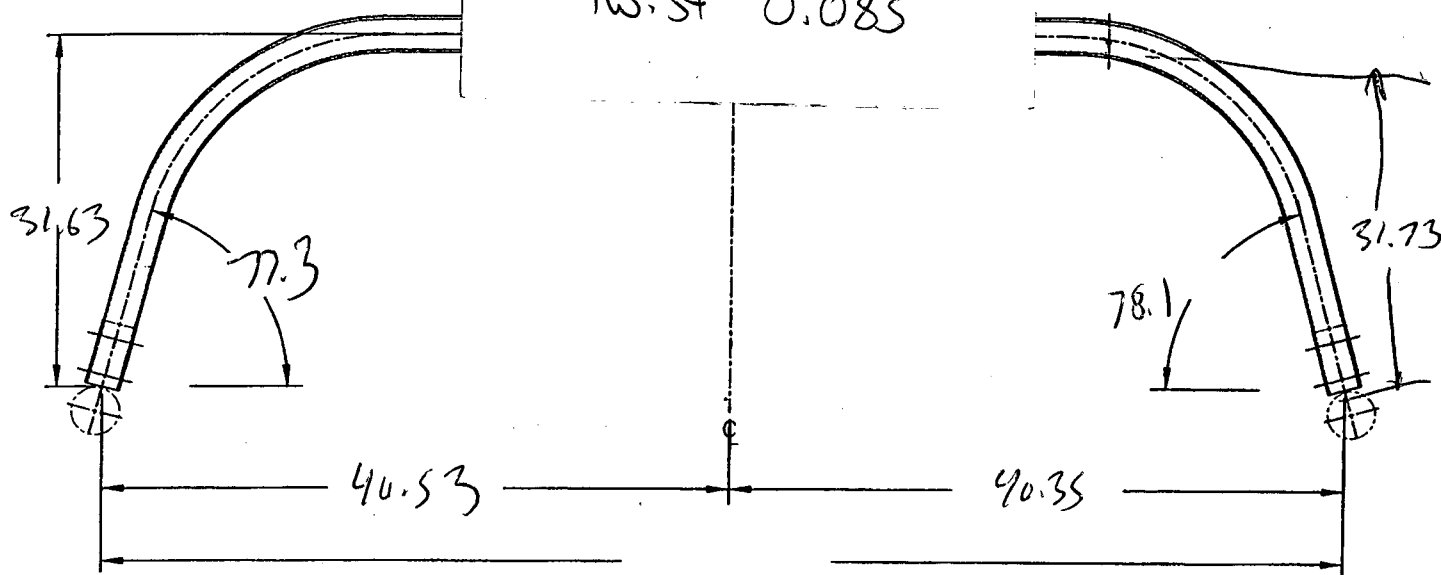
Required			
Hei			
1/2 S			
An			
Total			

L 31.5625 R 31.750

1/2 40.53 40.350

< 77.2 78.2

twist 0.083



Comments
Twist = 0.135
SCRAP UP 12.05.15

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

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NOTE: Date & initial all entries

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH = 122.700±0.06
- FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX
- IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 29.85 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
BENDING.
- BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 81523 MCV
12/03/15

RELEASED
2011-07-08
MP

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-241	REV. F SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS

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NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT
WRITTEN PERMISSION FROM DART AEROSPACE LTD.

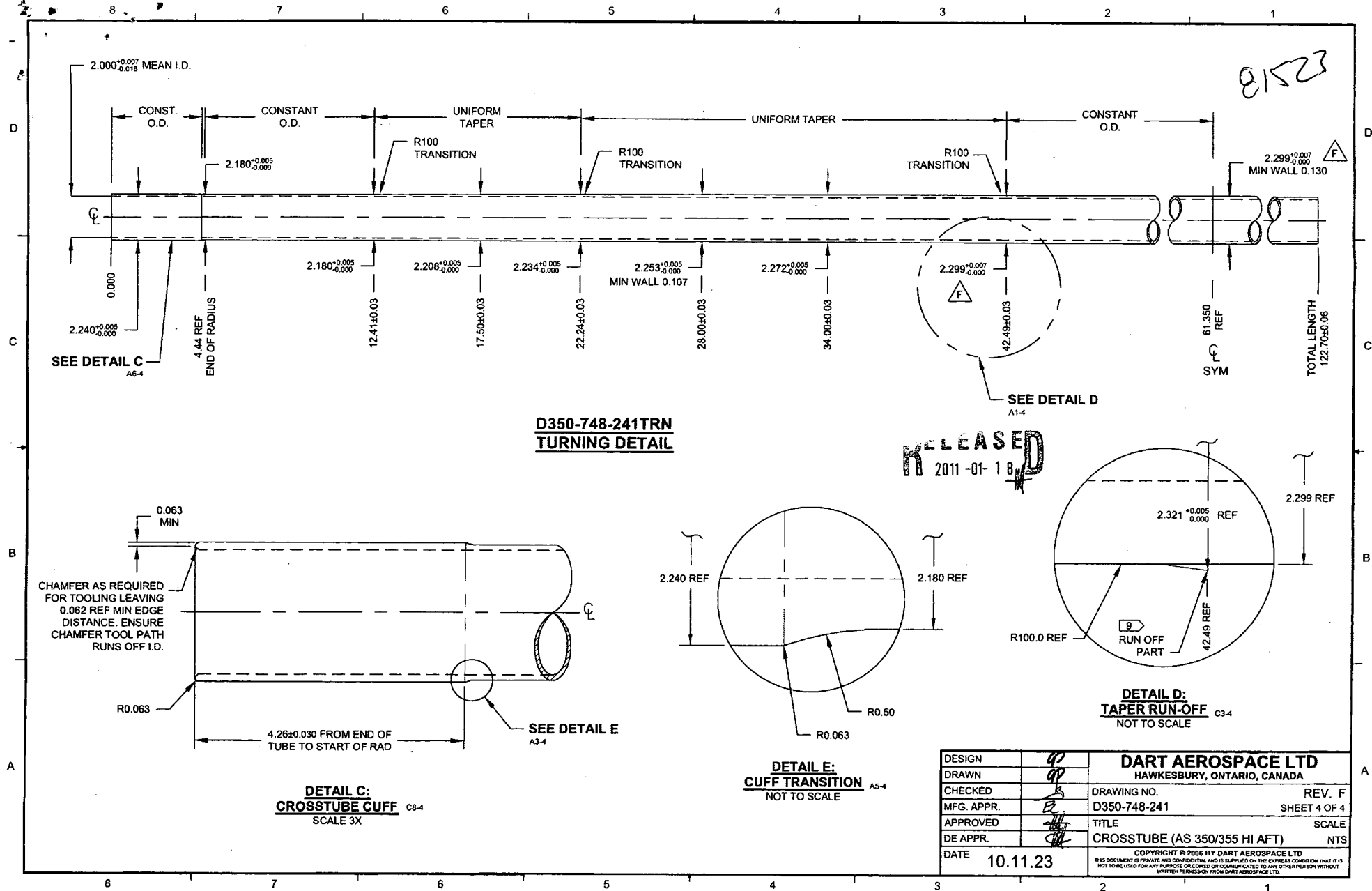
W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DRAWING NO. D350-748-241	TITLE CROSSTUBE (AS 350/355 H AFT)	REV. F	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D350-748-241-F-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>JP</i>	CHECKED <i>B</i>	MFG. APPR. <i>JA</i>	APPROVED <i>JP</i>		DE APPR. <i>JA</i>		
DATE 12.04.02	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03		DATE 12.04.03		

PURPOSE:

ADD A STRESS RELIEF OPERATION FOLLOWING BENDING

CHANGE:

ADD

10) AFTER BENDING: STRESS RELIEF AT 650°F ± 25°F FOR A MINIMUM OF 2 HRS.
AIR COOL TO AMBIENT TEMPERATURE
(REF. AMS2759/1E)

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 215

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
PO16638		Steel		

SPÉCIFICATIONS DU PROCÉDÉ processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results
Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
9	270	D350-748-101 (7) CROSS TUBE (2) D350-748-201 CROSS TUBE CONTENANT: 1 NIL

Operation	Temp. spécifiée Specified Temp	Temps de tremp Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							
2,00 PREPARINC	COMPTAGE									
3,00 STRESS RE	650 +/-25°F	2 hrs	air			701				
4,00 FINAL INSP							04-05-2012			04-05-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer: 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

APPROUVÉ par / Approved by:

Stu Salame

MET
16

DATE: 2012-04-05

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client. / We certify that all the information on this report is exact and in accordance with the order requirements.



Metcor Inc.
560, boul. Arthur-Sauvé
St-Fustache (Québec) J7R 5A8
Tél: 450-491-5498
Télécopieur/Fax: 450-491-6454

Certificat de conformité

Certificate of conformance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K8A 1K7

LIVRÉ À / shipped to:
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K8A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
		Steel		

SPÉCIFICATIONS DU PROCÉDÉ

processing specifications

STRESS REL


SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
2	270	D350-748-141-F-1

COMMENTAIRES / comments

INSPECTEUR / inspector:

Smyth 

DATE: 2012-04-05

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: May-08-2012

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114046

INVOICE #: 60317

**CONTRACT OR
PURCHASE ORDER #** PO16826

DESCRIPTION: SKID

QTY 1

P/N # d350-748-201

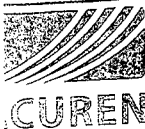
S/N # 81523

CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2.
MPI IAW ASTM-E-1444. BAKE HEAT CHART # 12-425 AND # 12-451.

CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.

Approved Inspector: _____





RAPPORT D'INSPECTION PAR RESSUAGE

P - 11201

PAGE 1 DE 2

CLIENT
ATTENTION
DRESSER

Saint Aerospace
Mme. Chantel
1270 Aberdeen St
Hawkesbury, Ont

DATE
N° TRAVAIL
ACUREN
N° CLIENT PO/WO
SITE DE TRAVAIL
ACCEPTATION STD.

May 17th 2012
188-12-2012
30551
Hawkesbury
ASLY 5/17/05

DATE/RÉV. 2005

PROJET
EM(S) EXAMINÉ

Inspection Fluorescent on crankshafts external surface
9 Crankshafts

DESCRIPTION DES TRAVAUX	N° PROCÉDURE	LT	DATE/RÉV.	N° TECHNIQUE	LT	DATE/RÉV.
9 Crankshafts see below			2009			2009
Fluorescent inspection, 100% on external surface on 9 Crankshafts						

DÉTAILS DES INSPECTIONS			
MÉTHODE :	<input type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> LAVABLE À L'EAU
MARQUE :			<input type="checkbox"/> MÉTHODE DISSOLVANT
PÉNÉTRANT :			<input type="checkbox"/> PRÉ-ÉMULSIONNANT
DISSOLVANT PÉNÉTRANT :			LUM. NOIRE S/N 112460
RÉVÉLATEUR :			<input type="checkbox"/> PUISS. > 1000 µ W/cm²
TYPE RÉVÉLATEUR :	<input type="checkbox"/> NON AQUEUX	<input type="checkbox"/> AQUEUX	<input type="checkbox"/> AMBIANT < 2 fc
			ÉQUIP. LUMIÈRE
			<input type="checkbox"/> LAMP. POCHÉ
			<input type="checkbox"/> LAMP. CULASSE
			<input type="checkbox"/> PUISS. > 100 fc @ SURFACE
			AUTRES
			MÈTRE LUM. N/S
			DATE CAL DUE
SURFACE INSPECTÉE			
CONDITION SURFACE	<input type="checkbox"/> MEULÉE	<input type="checkbox"/> SOUDÉE	<input type="checkbox"/> MACHINÉE
TEMPÉRATURE SURFACE	<input type="checkbox"/> < - 4°C / 20°F	<input type="checkbox"/> - 4°C / 20°F DE 10°C / 50°F	<input type="checkbox"/> GRENAILLÉE
			<input type="checkbox"/> 10°C / 50°F DE 52°C / 125°F
			<input checked="" type="checkbox"/> MÉTAL PROPRE
			<input type="checkbox"/> > 52°C / 125°F
RÉSULTATS- (<input type="checkbox"/> MÉTRIQUE <input type="checkbox"/> IMPÉRIAL)			

See other sheet
for result

P/O 17031

Étendue des Services

L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

SIGNATURES

REPRÉSENTANT

TECHNICIEN (SIGNATURE)

NOM (MOULÉ)

Bar Titley

MOULÉ

SIGNATURE

FTJ #

RAPPORT

RÉVISÉ PAR:

NOM

INITIALES

Pierre-Luc Titley

2^{ème} TECHNICIEN

ONGC NIVEAU

SNT NIVEAU

ONGC NIVEAU

SNT NIVEAU

ONGC N° REG.

13205

ONGC N° REG.

BLANCHE - COPIE DU CLIENT

JAUNE - COPIE DU BUREAU

ROSE - COPIE DU TECHNICIEN

OR - COPIE DU BUREAU

PT Décembre 200



RAPPORT D'ESSAI NON DESTRUCTIF

(SUITE)

RAPPORT #

P-11201

PAGE 2 DE 2

CLIENT	<u>Ant Aerospace</u>	DATE	<u>May 17, 2012</u>	HEURE	<input type="checkbox"/> AM <input checked="" type="checkbox"/> PM
ATTENTION		NO. TRAVAIL ACUREN	<u>188-12-2012</u>		
RÉSULTATS	<input type="checkbox"/> METRIQUE <input type="checkbox"/> IMPÉRIAL				

				Crosstubes					Inspection
①	work order	ID	83060	Item ID	D350-748-101				OK
②	"	"	77766	"	"	"	"	"	OK
③	"	"	76574	"	"	"	"	"	OK
④	"	"	81518	"	"	"	"	"	OK
⑤	"	"	76573	"	"	"	"	"	OK
⑥	"	"	77763	"	"	"	"	"	OK
⑦	"	"	73807	"	"	"	"	"	OK
⑧	"	"	81523	"	"	"	"	"	OK

⑨ # on crosstube B 83060

2 x-tubes under
batch # 83060
→ Preliminary Design

No paper work
Fit with this
number
Inspection OK

Étendue des Services

L'entente selon laquelle le Groupe Acuren Inc. exécute les services décrits, les observations et les expressions d'opinions faites par pas des déclarations ou des garanties ou ne peuvent être interprétées entières des décisions prises en matière d'ingénierie, de fabrication, services rendus.

Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le de localité ou dans une localité similaire. Aucune autre garantie, implicite

SIGNATURES

REPRÉSENTANT
À LA CLIENTÈLE

TECHNICIEN (SIGNATURE)

NAME (MOULÉE):

NIVEAU CGSB

No. ENREG. CGSB

NIVEAU SNT

No. ENREG. SNT

NIVEAU CGSB

No. ENREG. CGSB

SIGNATURE

2^e TECHNICIEN

NIVEAU SNT

FTJ #:

RAPPORT
REVISÉ PAR:

NOM

INITIALES

dent au-delà de l'exécution des services demandés. Il est entendu que toutes les on et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent a propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité rapport avec les services décrits dans les présentes ne peuvent excéder le coût des

emblables par d'autres fournisseurs de ce type de services opérant dans la même